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State of Montana

Project No. W-49-R-5

Name Fur Resources Surveys and Investigations

Job No. II-E

Title Mink Age and Sex Ratios

Period Covered May 1, 1955 to April 30, 1956

Segment 2 - Analysis of 1953 and 1954 Harvest Samples

Summary:

Statewide collections from the mink harvest provided approximately 1,000 carcasses for the 1953 season, 1,600 for 1954, and indicated nearly identical sex ratios for both years. The male: female ratios were 58:42 per cent or 137 and 136:100.

Specimens were aged as juvenile or adult by presence or absence of zygomatic suture and femoral tubercle (Greer, 1956).

Data between years and districts were statistically treated to provide indications of significance between tested populations.

A decided increase was noted in the 1954 harvest of juveniles in both sexes. Male juveniles:adults ratios increased from 70:30 per cent or 238:100 to 74:26 or 287. Female ratio increased from 70:30 or 230 to 73:27 per cent or 276:100.

The juveniles:adult female ratio increased from 3.55 to 4.26:1.

A correlation between increased juvenile harvest, total harvest and reduced spring muskrat trapping activities is suggested.

The 1954 sample appears to be more indicative of favorable district and state ratio data. Continued data will provide basis for establishing standard harvest ratios and possibly assist in suggesting true population compositions.

Weighing the 1955 mink harvest and statewide weather conditions along with available data, management suggestions for mink only would be; curtailment or elimination of spring muskrat trapping seasons.

Further analysis is necessary for determining most productive and least detrimental management techniques for coexistent mink-muskrat populations.

Objectives:

To obtain age and sex ratios as an indication of the status of mink populations in various areas of the state so that seasons may be based upon sound management principles.

Introduction:

The management of mink is difficult to accomplish without considering coexistent muskrat populations. Prior to the 1953-54 trapping season, muskrats pelts provided a relatively stable remunerable value. A decline in muskrat prices for this season influenced many trappers to abandon muskrat trapping and exert greater effort for the more lucrative mink pelts.

This work was initiated to obtain qualitative and quantitative age and sex data, which, when supplemented with field studies, fur dealer reports and trapper mail survey, will provide the basis for valid information upon which to recommend fur seasons.

Techniques Used:

Trapper report cards and fur purchase records provided names of trappers who were known to harvest 25 or more mink during a trapping season. Preseason interviews were made with mink trappers throughout the state. Reasons and objectives of the study were explained and their cooperation was solicited. A letter of instruction for the handling of carcasses was sent to each cooperating trapper. The importance of keeping the catch grouped for periods of the season and saving all carcasses throughout the trapping season was stressed. Frequent collections were made during the season (Nov. 10 - Dec. 31). Each trapper was contacted for a final collection after the open season.

Mink carcasses were disarticulated for skull, rear quarters (pelvic girdle, femurs) and baculum. Each specimen was tagged with an identifying number and desiccated before cleaning by dermestid beetles. Washed, dried, individually numbered specimens were accessioned before age criteria examination (Greer, 1955).

Findings:

In an effort to interpret increases and decreases in ratios converted to the standard terminology of males:100 females, juveniles:100 adults, juveniles:100 adult females, etc.



(Hill and Kimball, 1948), an additional column of the actual per cent of basic numbers is included in all tables for comparative purposes.

Male:Female Ratios

State: The total sample collected during the 1954-55 season exceeded the previous sample by 60 per cent. A male:female sex ratio of 58:42, in per cent of actual numbers, was identical for both years. Conversion to standard ratios of males:100 females indicate the proportions to be 137 and 136:100 for 1953 and 1954 (Table 1, Appendix).

Two years' information is available only for Administrative Districts One, Three, Four, Five and the western portion of the state (Figure 1).

Comparable data do not show a statistical significance in sex ratios between years in these districts or totals for the state. (All significant values were determined from chi-square tests unless otherwise noted). Range of differences, between years for each district, of males:100 females ratio varied from -1 to 45. The range in percentage differences was 0 to 11. (Differences in percentage ratios between years will express the same values but of a positive or negative nature).

With a total specimen sample exceeding 600, the variation between two years' material did not exceed 3 per cent. A difference of 11 per cent did occur in District Five but the total sample tested was 174 specimens.

District One: A small decrease in the second year's sample does not appear to influence the 3 per cent decline in males and 3 per cent increase in the female harvest.

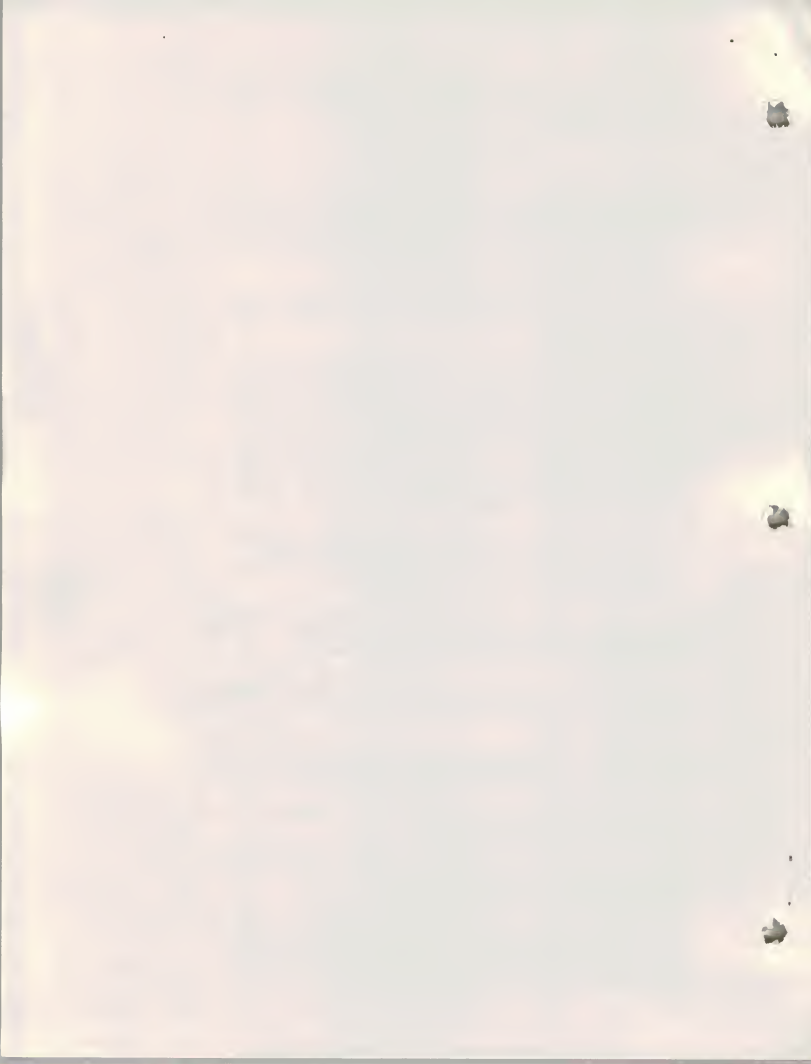
District Three: A sample two times that of the previous year indicated a 3 per cent decrease in the number of females harvested.

District Four: Similar samples for both years provided sex ratio information showing a 3 per cent decrease in the number of females harvested during the 1954 season.

District Five: This sample is considered inadequate for comparison with other districts.

West: The males' percentage ratio indicated an increase of 1 per cent while a positive value of five is noted in the males:100 females ratio between years.

The 1953 male:female sample from Districts One and Three was significantly different at the 5 per cent level; District Three harvest of females was 9 per cent greater than in District One. The above data for 1954 indicates the same



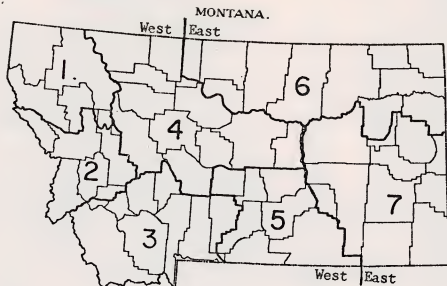


Figure 1. Administrative Districts

trend, 3 per cent more females taken in District Three than District One but this difference was not significant.

Districts Three and Four - 1953 - did not show the proportion of females to be different in the two districts. The 1954 sample showed a significance (10 per cent level) which can be attributed to larger samples tested. Both years indicated District Three harvested 6 per cent more female mink than District Four.

District Four and Six, 1954, indicated District Six to have an 11 per cent increased harvest of females which is significant at the 1 per cent level.

Comparing male:female ratio data for Districts One, Three and Four; Districts One, Three, Four and Five; 1953; and 1954; resulted in the 1953 sample for both groups to be significant at the 10 per cent level. Upon inspection the ratios appearing to influence the data were Districts One and Five. The 1954 samples were not significantly different (Table 2, Appendix).

Male Ratios

Total collections of male specimens for 1953 and 1954 were 558 and 922. Juvenile:adult ratios were 70:30 and 73:27 per cent or 230 and 276:100. The juvenile harvest increased from 2.3 to 2.7:1. Tests did not reveal that one year's



sample was significantly different from the following year's.

The range of differences between years for each district and state totals of the juveniles:100 adults was -64 to 124. In percentage values, the range of adult males was -10 to 6 (Table 3, Appendix).

District One: Increased take of adult males for 1954 was 6 per cent greater than in 1953. The juvenile take decreased from 2.45:1 in 1953 to 1.86 in 1954.

District Three: Decreased adult male harvest for 1954 was 10 per cent lower than in 1953. The juveniles:100 adults ratio increased from 195 to 319. These ratios were significant (5 per cent level) between years.

District Four: Juvenile harvest of 2.33:1 for 1953 increased to 2.85 in 1954, or, the 1954 harvest of adult males was a 3 per cent decline over previous year.

West: Decrease of 3 per cent in harvest of adult males, or, the juveniles:100 adults ratio increased in 1954 from 230 to 271. These populations were not significantly different.

The 1953 male juveniles:100 adults ratio in Districts One and Three was 247 and 195 but of no significance. In 1954 the ratio was 183 and 319 and these data indicated a significant difference between the two districts. Eleven per cent more juvenile males were taken in District Three than in District One, or, juvenile ratios increased from 1.86 to 3.17:1.

Other districts did not show any significance between the two years' data.

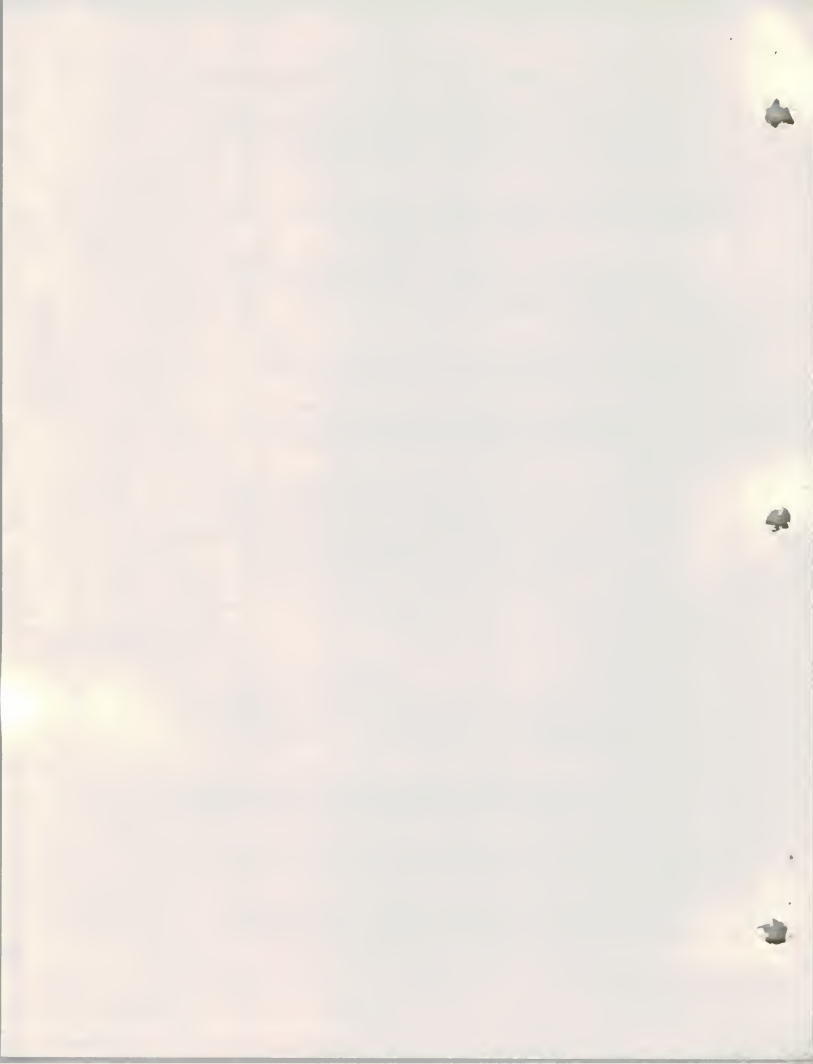
Female Ratios

The total female collection was 407 and 676 for 1953 and 1954. Juvenile:adult ratios of 58:42 and 62:38 per cent or 137 and 160:100 were not significant. Differences between years of some districts ranged from -12 to 8 per cent or -44 to 82:100 (Table 4, Appendix).

District One sample indicated a 12 per cent decrease in the number of adult females harvested during 1954. The age ratio between years was significant at 1 per cent level.

District Three showed a 2 per cent increase in harvest of adult females. The juveniles:100 adults ratio for 1953 was 160 and decreased to 149 during the 1954 season.

District Four had a 6 per cent decrease in adult females harvest but was not significant to the 1953 sample.



None of the following comparisons showed any significant difference between the 1953 and 1954 samples: Districts One and Three; Three, Four; Four, Six; One, Three; and One, Three, Four, Five.

Males and Females

Combining males and females to obtain the complete juvenile: adult ratio shows the adult ratio decreased 3 per cent and the juvenile ratio increased from 1.86 for 1953 to 2.13:1 in 1954. While Districts One, Three and Four each showed an increased juvenile harvest over the previous year's sample, none had a statistical significance between years. However, these districts influenced state totals enough to indicate the 1954 sample of 68:32 to be different (10 per cent level) from the 1953 sample of 65:35 per cent. The 1953 and 1954 juveniles:100 adults ratios were 183 and 216:100, an increase of 33:100 with a testing sample of 2500 specimens (Table 5, Appendix).

None of the following comparisons showed any significant difference between population samples for 1953 or 1954: District One and Three; Three, Four; Four, Six; One, Three, Four; and One, Three, Four, Five.

Juveniles:Adult Females

Although a decided increase of juveniles:adult females appeared in the 1954 sample the data did not indicate the increase to be significantly different from the 1953 collection. The state ratio for juveniles increased from 78:22 or 363:100 in 1953 to 81:19 or 420 in 1954.

With differences between some districts ranging from -5 to 0 per cent or -4 to 134:100, there was none to show a statistical difference between years. The 1953 sample for District Four had a 356 juveniles:100 adult females ratio and in 1954 increased to 490:100 but was not significant (Table 6, Appendix).

Male Ratios Vs. Female Ratios

A comparison of male and female ratios indicates a very significant difference (1 per cent level) exists between the two. The 1953 sample shows a male ratio of 70 per cent juvenile to 30 per cent adults or 230:100 and the female ratio was 58:42 or 137. A 1954 sample indicates more juveniles of both sexes to have been harvested but the male and female ratios have a similar trend as the previous year. A male ratio of 73:27 or 276:100 and female ratio of 62:38 or 160:100, when tested, was significant at the 1 per cent level (Table 7, Appendix).



State samples, indicative of the harvest, show a 58 per cent male to 42 per cent female composition. A ratio of 56:44 per cent is also significantly different from a theoretical 50:50 ratio. The District Five, 1954 ratio of 55:45 is approaching the theoretical ratio, however, they were not significant but the testing sample was approximately one fourth of the foregoing tests.

Seasonal Variations of Age and Sex Ratios

Techniques Used:

The objective of making a weekly carcass collection from all cooperating trappers throughout the state proved to be difficult to attain. It was found that the majority of trappers would not tag or segregate their catches as to periods of the open season (Nov. 10 - Dec. 31). To obtain the seasonal age and sex ratios of the harvest, collections were made from trappers as frequently as possible. With some assurance, specimens could be confined to periods of the season.

Collected specimens were tagged as being trapped on or between collecting dates from individual trappers. Specimens were tabulated in five day groups for the season but this sparse data was consolidated into groupings of ten days to provide larger samples for testing.

Findings:

Males:Females

Specimens collected for the 1953 sample indicated the male:female ratio varied between the five periods of the season (Table 8, Appendix). The November 10-19 period had a greater proportion of males harvested than females (157:100) compared to the state average of 137:100.

Statistical analysis showed only the Nov. 10-19 and Dec. 1-10 group to be significantly different, 10 per cent level. These ratios were 61:39 and 53:47 per cent or 157 and 113:100 with differences of 8 per cent or 44. Groupings having differences of 6 per cent and 36:100 were not significant.

The 1954 total male:female ratio showed a significant difference (5 per cent level) between the Nov. 10-19 ratio. These were: 58:42 and 63:37 per cent or 171 and 136:100 with differences of 5 per cent or 35:100. Testing sample was approximately 2000 specimens.

Similar differences, 5 per cent and 34, occurred for Nov. 10-19 and Nov. 20-30 periods but when tested did not have a value of significance. This sample was approximately 1,000.



Further comparisons indicate more males harvested during the first period of the 1954 season and the trend decreases while females increase in the harvest. The Nov. 10-19 and Dec. 1-10 periods were significantly different (5 per cent level) whereas Nov. 10-19 and Dec. 11-20; Nov. 10-19 and Dec. 21-31 were significant at the 1 per cent level. Ratio differences ranged from 7 to 12 per cent or 46 to 69:100 but these tested samples were approximately two times the available sample for similar comparisons of the 1953 material (Table 9, Appendix).

Males - Juveniles:Adults

A maximum ratio of juveniles:adult males (75:25 per cent) was harvested during the first period, Nov. 10-19, of the 1953 open season. The Nov. 10-19 and Dec. 21-31 (first and last) periods were the only ones to be significant, 5 per cent level.

The 1954 sample showed definite differences for all groups tested against the opening season group, Nov. 10-19. With samples of approximately 400, differences in ratios of 7 per cent or 139:100 indicated significant differences between tested populations.

Females - Juveniles:Adults

Both years' data indicate the maximum juvenile female harvest to be approximately during the Nov. 20-30 portion of the season. This second period peak differs from the juvenile male peak which occurred during the first period of the open season.

The lowest juvenile ratio was during the Dec. 11-20 period which preceded the closing period of the season. Testing of groups did not show any to be significantly different from another although one had an 8 per cent or 48:100 difference between ratios (Table 9, Appendix)

Males and Females Combined - Juveniles:Adults

The 1953 juveniles:adults ratio of males and females was approximately the same throughout the first four periods of the open season with the last period (Dec. 21-31) to be the only one to approach a significant level, 10 per cent.

These ratios for the 1954 sample, when compared with first period, were all significant except for the Nov. 20-30 period. More juveniles were harvested during the Nov. 10-30 period. More juveniles were harvested during the Nov. 10-30 period than succeeding ones. Significant differences between groups ranged from 6-14 per cent and 70-139:100.

Juveniles:Adult Females

The seasonal variation of juveniles:adult females ratio



maintains the same trend of more juveniles harvested during the early open season. The maximum is dispersed over the periods of Nov. 10-30. The larger sample for 1954 showed all periods, except Nov. 20-30. To have this ratio to be significantly different to the Nov. 10-19 period.

Discussion:

It appears that a sample approaching 300 specimens is required to indicate a sex ratio proportion approximating the total sample ratio of 58:42 per cent. District Six, 1954 collection of 194 specimens provided a 51:49 per cent ratio. District Three, 1953 collection of 247 specimens resulted in a 53:47 per cent ratio. The next highest collection, District One, 1954 of 287 gave a 59:41 per cent ratio.

The increased female harvest in District Three for the 1954 sample shows a 3 per cent greater female harvest over District One and 6 per cent increase over District Four. Although not of significant values, it would be indicative of a trend that females were trapped more seriously than in other areas.

Information reveals the female--juvenile:adult ratio in District Three is not appreciably different from other districts or state average. Assuming trapping conditions throughout the state were similar, foregoing data and analysis show a progression alteration of sex ratios during a season.

State totals for 1954 reveal a 4 per cent decline in the number of adult female mink harvested. The juveniles:adults ratio increased from 1.38 in 1953 to 1.63:1 in 1954 but these differences were not significant.

In testing samples involving more than 2300 specimens, differences of 3 per cent in the juveniles:adults ratio and differences of 31 in the juveniles:100 adults ratio were significant at the 10 per cent level. In smaller test samples, district totals, variations of 5 per cent and 49:100 were not statistically significant between the two years' collection.

A definite trend appears at the beginning of the open season indicating more males harvested than females with a ratio exceeding the state average. The succeeding grouping shows a progressive decline of males, and conversely, an increase of females harvested as the season progresses. The increased ratio depicted in the Dec. 11-20, 1953 group is attributed to a few samples inadvertently placed in this category due to the inability to collect from trappers before these dates. The samples would more correctly be dispersed in the three previous groups but for lack of definite identification were grouped as when collected.

The 1954 sample, nearly two times greater than the collection



for 1953, provides a more reliable indication of seasonal age ratio trends. Its data support a suspected trend for the 1953 collection.

A very small, and insignificant, difference occurred in the female age ratio between the first and last periods of the open season when compared to the same ratios available for the male. Each sex approximated a 60:40 juveniles:adults ratio during the last period, Dec. 21-31, of the open season. The female age ratio, during first period of the season was almost 60:40 whereas the males were approximately 80:20.

Conclusions:

Comparable information providing ratio data showing a range between two years' similar information is not validly declared different until statistically analyzed but a trend may be gleaned from the data. The 1953 and 1954 male and female juveniles:adults ratio of 65:35 per cent or 183:100 and 68:33 per cent or 216:100 was derived from a sample of 2563 specimens. Ratios indicated a 3 per cent or 33:100 range between the two years' data and proved to be significant at a 10 per cent level. The juveniles:adult females ratios from 2149 specimens from 1953 and 1954 was 78:22 per cent or 363:100 and 81:19 or 420:100. A 3 per cent difference or 57:100 range was not significant. These groupings, both having a 3 per cent range and one with a 33:100 difference was significant whereas the group with a 57:100 difference was not significant, would point out that differences between two years' data of per cent or standard ratios are dependent upon testing sample size.

Sex ratios for both years remained the same, however, the age ratio of each sex indicated a trend for an increased juvenile harvest. Although a spring muskrat season was declared for the 1953-54 season, data show the muskrat harvest to be approximately 47 per cent less than the previous season and the mink harvest increased 26 per cent. This decrease in muskrat take is attributed to prevailing prices rather than extensive weather conditions curtailing trapping pressure. Reduced spring muskrat trapping may have influenced a decreased illegal mink harvest resulting in a greater survival of reproducing females and is reflected by an increased juvenile mink harvest during the 1954 mink season.

Further analysis of mink-muskrat harvest data will be reported at a later date.

An increased juvenile harvest over the preceeding season during the first and second periods, Nov. 10-19 and Nov. 20-30, tends to support the belief of juveniles being more vulnerable to harvest than adults, providing a wild population was approximating a 50:50 ratio. This may indicate a

greater range, foraging activities or wanderings of un-established juveniles attempting to acquire a secure home range. Possibly inexperience and inquisitiveness is greater in juveniles than adults and may account for a larger harvest of juveniles, or; a greater proportion of the mink populations are juveniles and the probability, by chance alone, of catching a juvenile is greater than for trapping an adult. The possibility of selective trapping for juveniles or adults, other than a few exceptional trappers but confined to sexes, is beyond the control or ability of a trapper during the early periods of the open season. It is doubtful that any cooperating trapper has withheld a portion of his harvest in an attempt to perjure sex or age ratios.

The more reticent habits of the female, providing a smaller range than the males, may be indicated by proportionate variations in the sample. Notwithstanding that a harvest sample is not truly indicative of true populations; a theoretical 50:50 male to female parturient occurrence, survival rates, biology and life history data is most necessary for interpretation of harvest data.

Recommendations:

It is recommended that succeeding years' material be obtained to indicate age and sex ratios of the harvest throughout the state. Each year's material will add to and provide valid data from which trends may be gleaned if not providing statistical assurance of differences between: males, females, juveniles, adults, years, districts and periods of the season.

It is recommended that a population study be made which will provide knowledge of the biology and life history of wild mink: age classes, sex ratios, home ranges, reproduction, litter size, densities, dispersal, fluctuations, depressants, population turnover rate, trapped or protected populations, and repopulating rates.

Due to difficult trapping conditions prevailing over the entire trapping season, statewide, during the 1955 mink season, it is recommended that no serious manipulations of trapper pressure are necessary for the 1956 mink season.

Until further information becomes available, it is also recommended that spring muskrat trapping seasons be discouraged or eliminated to assure a maximum sustained yield from mink populations. The 1954 harvest indicated an increased proportion of juveniles of both sexes which may be correlated to a definite decrease in the previous spring muskrat trapping pressure.

It is further recommended that all available mink and muskrat fur take data be recapitulated, from Fur to Administrative



District basis, to provide information necessary for evaluating mink and muskrat for trapping economy and management aspects.

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Prepared by Kenneth R. Greer Approved by Fletcher E. Newby
Date April 15, 1956 Wynn G. Freeman



TABLE 1
SEX AND AGE RATIOS FROM STATEWIDE HARVEST SAMPLES

Year	Dist.	Sample Size	dd	99	Per Cent dd:99	dd: 10000	MALES ^a				FEMALES ^b				MALES AND FEMALES				JUVENILES:ADULT FEMALES			
							Juv.	Ad.	Per Cent Juv:Ad.	Juv: 100 Ad.	Juv.	Ad.	Per Cent Juv:Ad.	Juv: 100 Ad.	Juv.	Ad.	Per Cent Juv:Ad.	Juv: 100 Ad.	Juv.	Ad.	Per Cent Juv:Ad.	Juv: 100 Ad.
1953	1	320	198	122	62:38	162	141	57	71:29	247	68	54	56:44	126	209	111	65:35	188	209	54	79:21	387
54	1	287	170	117	59:41	145	110	60	65:35	183	79	38	68:32	208	189	98	66:34	193	189	38	83:17	497
1953	2	0	-	-	-	-	-	0	-	-	-	1	-	-	-	2	-	-	-	1	-	-
54	2	3	2	1	-	-	2	0	-	-	0	1	-	-	-	1	-	-	2	-	-	-
1953	3	247	130	117	53:47	111	86	44	66:34	195	72	45	62:38	160	158	89	64:36	178	158	45	78:22	351
54	3	556	314	242	56:44	130	239	75	76:24	319	145	97	60:40	149	384	172	69:31	223	384	97	80:20	596
1953	4	366	216	150	59:41	144	151	65	70:30	232	84	66	56:44	127	235	131	64:36	179	235	66	78:22	356
54	4	416	259	157	62:38	165	191	68	74:26	281	98	59	62:38	166	289	127	69:31	228	289	59	83:17	490
1953	5	32	14	18	44:56	77	11	3	79:21	367	11	7	61:39	157	22	10	69:31	220	22	7	76:24	314
54	5	142	78	64	55:45	122	59	19	76:24	311	34	30	53:47	113	93	49	65:35	190	93	30	76:24	310
1953	West	965	558	407	58:42	137	389	169	70:30	230	235	172	58:42	137	624	341	65:35	183	624	172	78:22	363
54	West	1,404	823	581	59:41	142	601	222	73:27	271	356	225	61:39	158	957	447	68:32	214	957	225	81:19	425
1953	6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	6	194	99	95	51:49	104	76	23	77:23	330	60	35	63:37	171	136	58	70:30	234	136	35	80:20	389
1953	7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	East	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	East	194	99	95	51:49	104	76	23	77:23	330	60	35	63:37	171	136	58	70:30	234	136	35	80:20	389
1953	State	965	558	407	58:42	137	389	169	70:30	230	235	172	58:42	137	624	341	65:35	183	624	172	78:22	363
54	State	1,598	922	676	58:42	136	677	245	73:27	276	416	260	62:38	160	1,093	505	68:32	216	1,093	260	81:19	420

a, b - Aged by zygomatic suture and femoral tubercle.



TABLE 2

MALE:FEMALE RATIO DIFFERENCES

District	Year	Sample Size	Per Cent Ratio	Per Cent Diff.	Standard Ratio	Standard Diff.	Chi Sq. Value
State	1953	2563	58:42	0	137:100	1	.0039
State	1954		58:42		136		
1	1953	607	62:38	3	162	-17	.42
1	54		59:41		145		
3	1953	803	53:47	3	111	+19	1.02
3	54		56:44		130		
4	53	782	59:41	3	144	+11	.85
4	54		62:38		165		
5	53	174	44:56	11	77	+45	1.31
5	54		55:45		122		
West	53	2369	58:42	1	137	+ 5	.14
West	59		59:41		142		
1	1953	567	62:38	9	162	51	4.88 *
3			53:47		111		
1	1954	843	59:41	3	145	15	.59
3			56:44		130		
3	1953	613	53:47	6	111	33	2.43
4			59:41		144		
3	1954	972	56:44	6	130	35	3.28 "
4			62:38		165		
4	1954	610	62:38	9	165	61	6.88 **
6			51:49		104		
1	1953	933	62:38		162		5.03 "
3			53:47		111		
4			59:41		144		
1	1954	1259	59:41		145		3.30
3			56:44		130		
4			62:38		165		
1	1953	965	62:38		162		7.69 "
3			53:47		111		
4			59:41		144		
5			44:56		77		
1	1954	1401	59:41		145		4.17
3			56:44		130		
4			62:38		165		
5			55:45		122		

**--Significant at the 1 per cent level, *-5 per cent level, "-10 per cent level.



TABLE 3

MALES-JUVENILE:ADULT RATIO DIFFERENCES

District	Year	Sample Size	Per Cent Ratio	Per Cent Diff.	Standard Ratio	Standard Diff.	Chi Sq. Value
State State	1953 54	1480	70:30 73:27	3	230:100 276	+46	2.33
1 1	1953 54	368	71:29 65:35	6	247 183	-64	1.78
3 3	1953 54	444	66:34 76:24	10	195 319	+124	4.65 *
4 4	1953 54	475	70:30 74:26	4	232 281	+49	.86
5 5	1953 54	92	79:21 76:24	3	367 311	-56	.06
West West	1953 54	1381	70:30 73:27	3	230 271	+41	1.79
1 3	1953	328	71:29 66:34	5	247 195	52	.94
1 3	1954	484	65:35 76:24	11	183 319	136	7.13 **
3 4	1953	346	66:34 70:30	4	195 232	37	.52
3 4	1954	573	76:24 74:26	2	319 281	38	.42
4 6	1954	358	74:26 77:23	3	281 330	49	.3
1 3 4	1953	544	71:29 66:34 70:30		247 195 232		.98
1 3 4	1954	743	65:35 76:24 74:26		183 319 281		7.45 *
1 3 4 5	1953	558	71:29 66:34 70:30 79:21		247 195 232 367		1.52
1 3 4 5	1954	821	65:35 76:24 74:26 76:24		183 319 281 311		7.82 *

**--Significant at the 1 per cent level

*--Significant at the 5 per cent level



TABLE 4

FEMALES-JUVENILE:ADULT RATIO DIFFERENCES

District	Year	Sample Size	Per Cent Ratio	Per Cent Diff.	Standard Ratio	Standard Diff.	Chi Sq. Value
State	1953	1083	58:42	4	137:100	+23	1.52
State	1954		62:38		160		
1	1953	239	56:44	12	126	+82	6.9 **
1	54		68:32		208		
3	53	359	62:38	2	160	-11	.09
3	54		60:40		149		
4	53	307	56:44	6	127	+39	1.3
4	54		62:38		166		
5	53	82	61:39	8	157	-44	.4
5	54		53:47		113		
West	53	988	58:42	3	137	+21	1.24
West	54		61:39		158		
1	1953	239	56:44	6	126	34	.8
3			62:38		160		
1	1954	359	68:32	8	208	59	1.9
3			60:40		149		
3	1953	267	62:38	6	160	33	.8
4			56:44		127		
3	1954	399	60:40	2	149	17	.2
4			62:38		166		
4	1954	252	62:38	1	166	5	.01
6			63:37		171		
1	1953	389	56:44		126		1.07
3			62:38		160		
4			56:44		127		
1	1954	516	68:32		208		1.95
3			60:40		149		
4			62:38		166		
1	1953	407	56:44		126		1.18
3			62:38		160		
4			56:44		127		
5			61:39		157		
1	1954	580	68:32		208		3.99
3			60:40		149		
4			62:38		166		
5			53:47		113		

** Significant at the 1 per cent level



TABLE 5

MALE AND FEMALE-JUVENILE:ADULT RATIO DIFFERENCES

District	Year	Sample Size	Per Cent Ratio	Per Cent Diff.	Standard Ratio	Standard Diff.	Chi Sq. Value
State	1953	2563	65:35	3	183:100	+33	3.79 "
	54		68:32		216		
1	53	607	65:35	1	188	+5	.01
	54		66:34		193		
3	53	803	64:36	5	178	+45	2.02
	54		69:31		223		
4	53	782	64:36	5	179	+49	2.43
	54		69:31		228		
5	53	174	69:31	4	220	-30	.12
	54		65:35		190		
West	53	2369	65:35	3	183	+31	3.15 "
	54		68:32		214		
1	1953	567	65:35	1	188	10	.1
	3		64:36		178		
1	1954	843	66:34	3	193	30	.8
	3		69:31		223		
3	1953	613	64:36	0	178	1	.04
	4		64:36		179		
3	1954	972	69:31	0	223	5	.01
	4		69:31		228		
4	1954	610	69:31	1	228	6	.02
	6		70:30		334		
1	1953	933	65:35		188		.14
			64:36		178		
1	1954	1259	66:34		193		1.30
			69:31		223		
1	1953	965	65:35		188		.38
			64:36		178		
1	1954	1401	66:34		193		1.42
			69:31		223		
1			69:31		228		
			65:35		190		

" - Significant at the 10 per cent level



TABLE 6

JUVENILES:ADULT FEMALES RATIO DIFFERENCES

District	Year	Sample Size	Per Cent Ratio	Per Cent Diff.	Standard Ratio	Standard Diff.	Chi Sq. Value
State	1953	2149	78:22	3	363:100		
State	54		81:19		420	+57	1.78
1	53	490	79:21	4	387	+110	1.13
1	54		83:17		497		
3	53	682	78:22	2	351	+45	.34
3	54		80:20		396		
4	53	649	78:22	5	356	+134	2.56
4	54		83:17		490		
5	53	152	76:24	0	314	-4	.00
5	54		76:24		310		
West	53	1978	78:22	3	363	+62	1.96
West	54		81:19		425		
1	1953	466	79:21	1	387	36	.1
3			78:22		351		
1	1954	708	83:17	3	497	101	1.1
3			80:20		396		
3	1953	504	78:22	0	351	5	.01
4			78:22		356		
3	1954	829	80:20	3	396	94	1.3
4			83:17		490		
4	1954	519	83:17	3	490	101	.9
6			80:20		389		
1			79:21		387		
3	1953	767	78:22		351		.23
4			78:22		356		
1			83:17		497		
3	1954	1056	80:20		396		1.90
4			83:17		490		
1			79:21		387		
3	1953	796	78:22		351		.34
4			78:22		356		
5			76:24		314		
1			83:17		497		
3	1954	1179	80:20		396		4.45
4			83:17		490		
5			76:24		310		

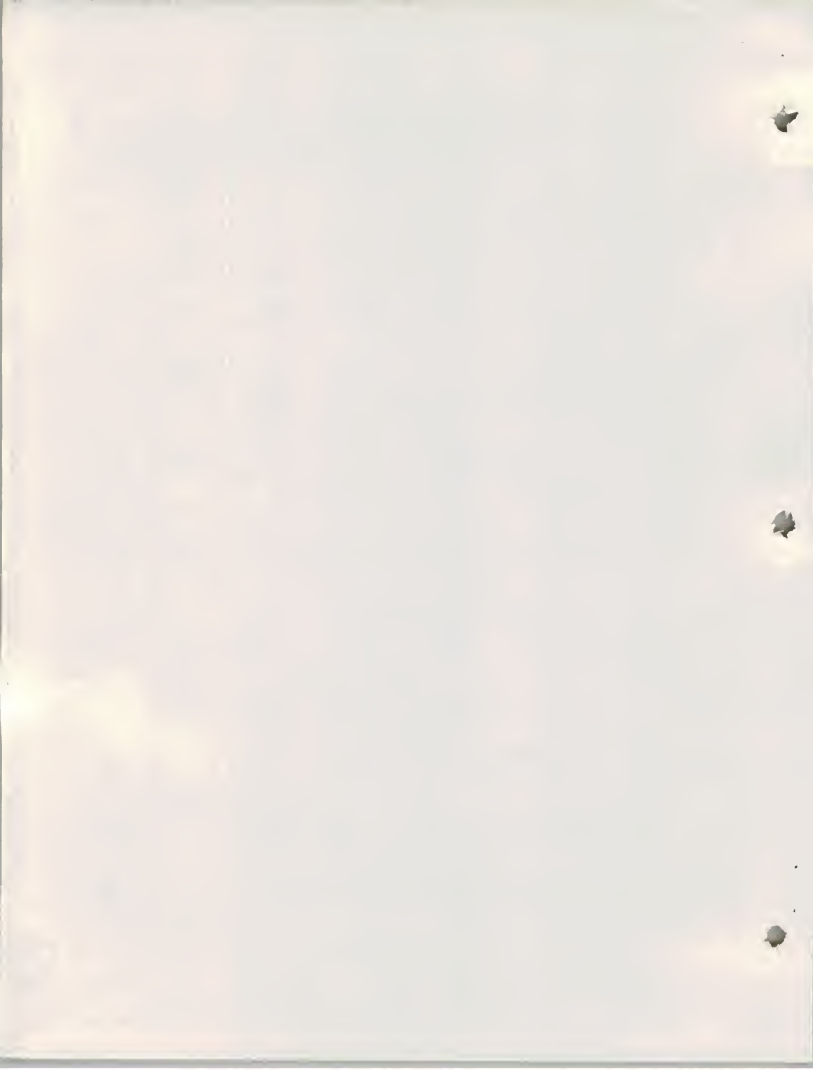


TABLE 7

MALE RATIO AND FEMALE RATIO DIFFERENCES

District	Year	Sample Size	Per Cent Ratio	Per Cent Diff.	Standard Ratio	Standard Diff.	Chi Sq. Value
State	1953	965	♂70:30 ♀58:42	12	230:100 137	93	14.76 **
State	1954	1598	73:27 62:38	11	276 160	116	25.7 **
1	53	320	71:29 56:44	15	247 126	121	7.98 **
1	54	287	65:35 68:32	3	183 208	25	.24
3	53	247	66:34 62:38	4	195 160	35	.56
3	54	556	76:24 60:40	16	319 149	170	16.78 **
4	53	366	70:30 56:44	14	232 127	105	7.45 **
4	54	416	74:26 62:38	12	281 166	115	5.91 *
5	53	32	79:21 61:39	18	367 157	210	1.15
5	54	142	76:24 53:47	23	311 113	198	.01
6	1954	194	77:23 63:37	14	330 171	159	4.28 *
West	1953	965	70:30 58:42	12	230 137	93	14.7 **
West	1954	1404	73:27 61:39	12	271 158	113	21.1 **

**-Significant at the 1 per cent level

*-Significant at the 5 per cent level



TABLE 8
SEASONAL VARIATIONS IN SEX AND AGE RATIOS

Sex Ratios	Year	Sample	dd	99	Per Cent dd:99	dd:100 99	Nov. 10-19				Nov. 20-30				Dec. 1-10				Dec. 11-20				Dec. 21-31			
							dd		Per Cent dd:99	dd:100 99	dd		Per Cent dd:99	dd:100 99	dd		Per Cent dd:99	dd:100 99	dd		Per Cent dd:99	dd:100 99	dd		Per Cent dd:99	dd:100 99
	1953	965	558	407	58:42	137	108	69	61:39	157	142	97	59:41	146	149	132	53:47	113	71	36	66:34	197	88	73	55:45	121
	1954	1,598	922	676	58:42	136	201	164	63:37	171	297	227	58:42	137	185	148	56:44	125	86	84	51:49	102	73	63	54:46	116
Sex Ratios	Year	Sample	Juv.	Ad.	Per Cent Juv:Ad.	Juv:100 Ad.	Juv.	Ad.	Per Cent Juv:Ad.	Juv:100 Ad.	Juv.	Ad.	Per Cent Juv:Ad.	Juv:100 Ad.	Juv.	Ad.	Per Cent Juv:Ad.	Juv:100 Ad.	Juv.	Ad.	Per Cent Juv:Ad.	Juv:100 Ad.	Juv.	Ad.	Per Cent Juv:Ad.	Juv:100 Ad.
	1953	558	389	169	70:30	230	81	27	75:25	300	98	44	69:31	223	105	44	70:30	239	52	19	73:27	274	53	35	60:40	151
	1954	922	677	245	73:27	276	227	54	81:19	420	219	78	74:26	281	127	58	69:31	219	60	26	70:30	231	44	29	60:40	152
	1953	407	235	172	58:42	137	38	11	55:45	123	58	39	60:40	149	80	52	61:39	154	19	17	53:47	112	40	33	55:45	121
	1954	676	416	260	62:38	160	103	61	63:37	169	144	73	66:34	197	86	62	58:42	139	46	38	55:45	121	37	26	59:41	142
Malee	1953	965	624	341	65:35	183	119	58	69:33	205	156	83	65:35	188	185	96	66:34	193	71	36	66:34	197	93	68	58:42	137
	1954	1,598	1,093	505	68:32	216	330	115	74:26	286	363	151	71:29	240	213	120	64:36	178	106	64	62:38	166	81	55	60:40	147
Femalee	1953	796	624	172	78:22	363	119	31	79:21	384	156	39	80:20	400	185	52	78:22	356	71	17	81:19	418	93	33	74:26	282
	1954	1,353	1,093	260	81:19	420	330	61	84:16	541	363	73	83:17	497	213	62	77:23	344	106	38	74:26	279	81	26	76:24	312
Malee and Femalee	1953	965	624	341	65:35	183	119	58	69:33	205	156	83	65:35	188	185	96	66:34	193	71	36	66:34	197	93	68	58:42	137
	1954	1,598	1,093	505	68:32	216	330	115	74:26	286	363	151	71:29	240	213	120	64:36	178	106	64	62:38	166	81	55	60:40	147
Juveniles: Adult Females	1953	796	624	172	78:22	363	119	31	79:21	384	156	39	80:20	400	185	52	78:22	356	71	17	81:19	418	93	33	74:26	282
	1954	1,353	1,093	260	81:19	420	330	61	84:16	541	363	73	83:17	497	213	62	77:23	344	106	38	74:26	279	81	26	76:24	312



TABLE 9
SEASONAL VARIATION OF RATIO DIFFERENCES

	1953						1954							
	Sample Size	Period*	Per Cent Ratio	Per Cent Diff.	Standard Ratio	Standard Diff.	Chi Sq. Value	Sample Size	Period*	Per Cent Ratio	Per Cent Diff.	Standard Ratio	Standard Diff.	Chi Sq. Value
Males: Females	1,142	Season 1	58:42 61:39	3	137:100 157	+20	.6	2,044	Season 1	58:42 63:37	5	136:100 171	+35	4.3*
	416	1 2	61:39 59:41	2	157 146	-11	.1	959	1 2	63:37 58:42	5	171 137	-34	2.5
	458	1 3	61:39 53:47	8	157 113	-44	2.81**	778	1 3	63:37 56:44	7	171 125	-46	4.6*
	284	1 4	61:39 66:34	5	157 197	+40	.8	615	1 4	63:37 51:49	12	171 102	-69	8.1**
	338	1 5	61:39 55:45	6	157 121	-36	1.42	581	1 5	63:37 54:46	9	171 116	-55	6.7**
Males- Juveniles: Adults	666	Season 1	70:30 75:25	5	230 300	+70	1.2	1,203	Season 1	73:27 81:19	8	276 420	+144	6.2*
	250	1 2	75:25 69:31	6	300 223	-77	1.0	578	1 2	81:19 74:26	7	420 281	-139	4.1*
	297	1 3	75:25 70:30	5	300 239	-61	.6	466	1 3	81:19 69:41	12	420 219	-201	8.9**
	179	1 4	75:25 73:27	2	300 274	-26	.06	367	1 4	81:19 70:30	11	420 231	-189	4.6*
	196	1 5	75:25 60:40	15	300 151	-149	4.89*	354	1 5	81:19 60:40	21	420 152	-268	13.5**
Females- Juveniles: Adults	476	Season 1	58:42 55:45	3	137 123	-14	.1	840	Season 1	62:38 63:37	1	160 169	+9	.08
	166	1 2	55:45 60:40	5	123 149	+26	.3	381	1 2	63:37 66:34	3	169 197	+28	.5
	201	1 3	55:45 61:39	6	123 154	+31	.5	312	1 3	63:37 58:42	5	169 139	-30	.7
	105	1 4	55:45 53:47	2	123 112	-11	.05	248	1 4	63:37 55:45	8	169 121	-48	1.4
	142	1 5	55:45 55:45	0	123 121	-2	.001	227	1 5	63:37 59:41	4	169 142	-27	.003
Males and Females- Juveniles: Adults	1,142	Season 1	65:35 67:33	2	183 205	+22	.4	2,043	Season 1	68:32 74:26	6	216 286	+70	5.4*
	416	1 2	67:33 65:35	2	205 188	-17	.1	959	1 2	74:26 71:29	3	286 240	-46	1.4
	458	1 3	67:33 66:34	1	205 193	-12	.09	778	1 3	74:26 64:36	10	286 178	-108	9.3**
	284	1 4	67:33 66:34	1	205 197	-8	.02	615	1 4	74:26 62:38	12	286 166	-120	8.3**
	338	1 5	67:33 58:42	9	205 137	-68	3.2**	581	1 5	74:26 60:40	14	286 147	-139	17.0**
Juveniles: Adult Females	546	Season 1	78:22 79:21	1	363 384	+21	.06	1,744	Season 1	81:19 84:16	3	420 541	+120	2.9*
	345	1 2	79:21 80:20	1	384 400	+16	.02	827	1 2	84:16 83:17	1	541 497	-44	.2
	387	1 3	79:21 78:23	1	384 356	-28	.08	666	1 3	84:16 77:23	7	541 344	-197	5.1*
	238	1 4	79:21 81:19	2	384 418	+34	.006	535	1 4	84:16 74:26	10	541 279	-262	8.1**
	276	1 5	79:21 74:26	5	384 282	-102	1.1	498	1 5	84:16 76:24	8	541 312	-229	4.4*

* = Period 1-Nov. 10-19; 2-Nov. 20-30; 3-Dec. 1-10; 4-Dec. 11-20; 5-Dec. 21-31; Season-Nov. 10-Dec. 31
 ** = Significant at 1 per cent level
 * = Significant at 5 per cent level
 * = Significant at 10 per cent level

